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DCM365 DEVELOPMENT FOR POWER PLANT PROJECTS

Improving the Commissioning Processes

Technology and Communication

2015

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TIIVISTELMÄ

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Wärtsilän toimittamat voimalaitosprojektit ovat kasvamassa kapasiteetiltaan ja viitekehyksiltään yhä suuremmiksi. Tällaisissa projekteissa kommunikoinnin ylläpito on hankalaa, koska sidosryhmät kasvavat ja dokumentteja syntyy huomattava määrä. Opinnäytetyön tarkoituksena on löytää toimivia keinoja viestinnän helpottamiseksi työmaalla.

Työn aluksi käydään läpi tavallisimmat projektiin kuuluvat toimintaprosessit ja työskentelytavat joilla pystytään varmistamaan projektinjohdollinen tasalaatuisuus ja vertailukelpoisuus organisaation muiden projektien kanssa. Työn tulosteena on käytännön tuomia esimerkkejä kommunikointityökalujen parantamiseksi.

Työn aikana kävi ilmi, että asiakas usein kokee olevansa päätöksenteossa ulkopuolinen. Tiedonkulku on asiakkaalle monesti näkymätöntä ja johtaa asiakkaan epävarmuuteen projektin hoidon suhteen. Avoimuus, läpinäkyvyys ja välittömyys ovat ensisijaisia tekijöitä asiakastyytyväisyydessä laajoissa projekteissa.

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ABSTRACT

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The scope and scale of Wärtsilä's projects is growing and as a result the project milieus and stakeholder numbers are growing, which leads to more complex communication. Open and honest communication is key when interacting with stakeholders and will reduce risk of unwanted delays. The purpose of this thesis is to find ways to communicate more effeciently on-site.

First off we will look at defined processes which help in making comparisons between different projects in an organisation. These processes are key components in building a solid foundation for a project. The findings in this thesis are based on on-site experience in commissioning a power plant.

The end product is a series of ideas that is suggested to be incorporated into the communication tool to be used by Wärtsilä in managing project communications.

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GLOSSARY

CROL - Customer Relations On-line. Survey made by PBI.

DCM - Document Control Module. Project communication tool.

FAQ - Frequently Asked Questions.

GW - Gigawatt. Unit of power.

HSE - Health, Safety and Environment.

IDM - Integrated Document Management. Part of Wärtsilä intranet system.

MDR - Master Data Register. Collection of data.

MW - Megawatt. Unit of power.

NCR - Non-conformity Report.

PBI - The company that makes the CROL surveys

SQAD - Site Quality Assurance Documentation. Quality system used at site.

WDSE - Wärtsilä Document Set Explorer. Mobile access to documents.

1 INTRODUCTION

Wärtsilä collects customer feedback regularly throughout the life of a project. These surveys are then put together to form a quarterly report highlighting issues in on-going and finished projects. One of the most outstanding issues is the customers' view on how conflicts or unexpected changes are handled. All the issues are not necessarily directly pointed at information exchange, but could be avoided all together with transparent and open communication.

Wärtsilä's ambitions to expand into ever larger power plants markets is one of the reasons why more sophisticated and customer oriented communications are needed. That is why Wärtsilä decided to develop the DCM365 cloud based communication tool for use on-site and in the home office. The current information systems used are scattered and incoherent in parts and a unified solution for customer communications is welcome. DCM365 is a customisable tool and in this thesis ideas for further development of the platform are given based on practical experience.

2 WÄRTSILÄ

2.1 Wärtsilä In Brief

Wärtsilä was founded as a saw mill in Tohmajärvi, Karelia in 1834 and went on to add an iron mill and other industrial businesses to its portfolio in the coming decades. By 1908 Wärtsilä was a modern steel mill and is producing its own power with the nearby rapids.

In 1938 the diesel engine era began as Wärtsilä signed a license agreement with Friedrich Krupp Germania Werft AG in Germany. The first diesel engine was produced in Turku in November 1942. /1/

One of Wärtsilä's most prominent products is the W32 engine of which Wärtsilä has produced over 6000 units since it's launch in the late 1970's. These engines are regarded as highly reliable and many examples produced thirty years ago are still running with over 200 000 operating hours. /2/

Today Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. Wärtsilä emphasizes technological innovation and total efficiency. Wärtsilä maximizes the environmental and economic performance of the vessels and power plants of its customers.

2.2 Wärtsilä Power Plants

Wärtsilä is leading global supplier of flexible power generation solutions with plants up to the range of 600MW. Wärtsiläs portfolio includes solutions for peaking, reserve and load-following power generation, as well as for balancing intermittent power production. One advantage Wärtsilä boasts of is fast track delivery, which ensure a speedy completion of the whole power plant and auxiliaries. As of 2014 Wärtsilä has 55GW of installed power in 169 countries around the world. Power Plants sales in 2013 were 1,5 billion and personnel over 1000. /3/

2.3 Wärtsilä Ship Power

Wärtsilä has a large portfolio in the ship building businness including propulsion, manoeuvring solutions, control systems and sealing solutions for all types of vessels and off-shore applications. Ship Power sales in 2013 were 1,3 billion and personnel of 3600. /3/

2.4 Wärtsilä Services

Wärtsilä supports its customers throughout the lifecycle of their installations. Wärtsilä provides service, maintenance and reconditioning solutions for both ship machinery and power plants. Wärtsilä is also capable of servicing other than Wärtsilä engines and has service stations in key ports of the world. Services net sales in 2013 were 1,8 billion with almost 11000 personnel. /3/

3 PROJECT MANAGEMENT

3.1 Definition of a Project

A project is a temporary endeavor undertaken to create a unique product, service or result. A project always has a definite ending and a beginning, and to reach the ending a project must be successfully completed or terminated. For a project to be successfully completed it needs to meet the requirements set in the beginning. These requirements are most commonly related, but not limited to, the schedule, budget and quality of the deliverable. A project can also be terminated prematurely if it is found impossible or non-feasible to complete according to requirements. /4, 5-6/

3.2 Project Management

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. The project manager is responsible for applying these instruments to successfully carry the project from the beginning to the end. The project manager must identify different requirements the project has, since every project is unique. Differing requirements in projects could be ones signaled for example by customer, officials in target location, or internal policies. The project manager must balance between the needs of these actors, and the needs of the project from a managerial point of view. Managerial needs of the project can be classified as ones related to:

- Scope, which states who is to deliver what in the project.
- Quality, which states the standards the deliverable should meet. The smallest of activities in projects are to be carried out with quality in mind, since the smallest of quality defects can have a great effect on the end-deliverable.
- Schedule is determined early on in the project planning phase. Sometimes it is necessary to stretch the schedule in order to meet required quality.

- Budget is determined early on in the sales phase of a project and is something that is a good guideline for the project manager to keep in mind. Sometimes budget sacrifices are necessary, but not something to rely on.
- Resources. The project manager needs to keep track that all necessary resources are available at needed times for the project to use. Insufficient resources are a risk for project schedule and budget.
- Risks. The project manager needs to make a risk management plan. Risks when thought of before-hand can be minimized or all together avoided. Risks could include sub-supplier competence, customs issues and customer financing issues and so on depending on the project milieu.

If one these above mentioned factors change, it is likely that at least one other factor is affected. If the schedule is shortened, for example, the budget needs to be increased in order to make things go faster by hiring more staff to deliver the project. Balancing these factors and determining which are more important than others is of great importance to reduce the effect of realized risks. By having a plan of action and communicating this plan with the customer reduces confusion and the time required to take corrective actions. /4, 6-7/

3.3 Project Processes

Project management processes give a set of guidelines how to work effectively in a given situation in a project, though it is always up to the project manager and project team to put everything into perspective as to how these guidelines are to be followed. This allows better consistency and comparability within an organization and its projects. Though these processes do appear chronological, they are seldom only one time events. Processes are over lapping throughout the project life cycle and depend on continuous feedback from other processes; for example the process of Monitoring and Controlling works in unison with the process of Execution, both giving inputs and outputs to one another. /4, 37-43/

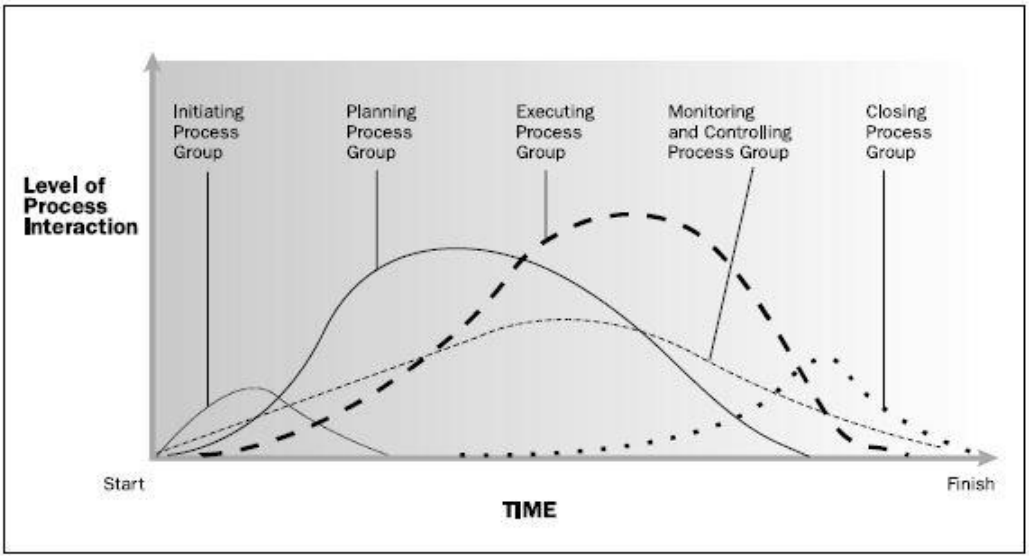

Figure 1. Process interaction over time /4, 41/

3.3.1 Initiating Process Group

The Initiating Process Group handles the processes that need to be done in order for the project to officially start. Within the initiating processes the scope of the project is defined as well as the initial budget and schedule and if not already assigned the project manager will be selected. The final product of this phase is the project charter which includes the basic information of the project, stakeholders and acts a summary for the project. The project can start once the charter is approved. /4, 44-46/

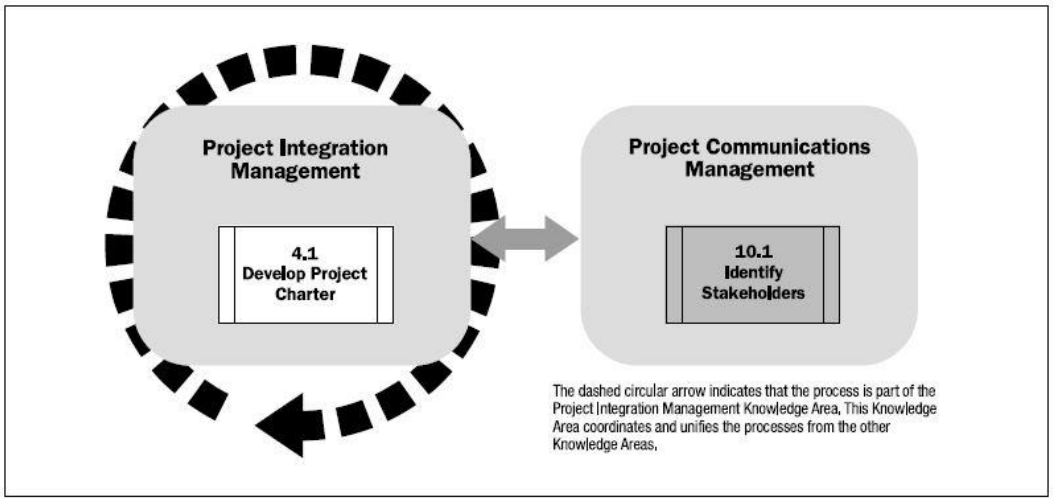

Figure 2. Initiating Process Group /4, 45/

3.3.2 Planning Process Group

The planning process is a group of processes which aim to put together the project management plan. During the process the total scope of the project, definition and refinement of objectives and the action plans to achieve these objectives are put together to create the core of the project. The project management plan and project documents developed as outputs from the planning process group will explore all aspects of the scope, time, costs, quality, communication, risk and procurements. All of these aspects require constant feedback and outputs from one another throughout the project and may sometimes lead to the need to revisit and revise the project management plan. This progressive detailing of the project management plan is called rolling wave planning. The project management plan is the core of the project and it should be encouraged to receive feedback from various levels of the project organization and external stakeholders before finalizing. /4, 46-55/

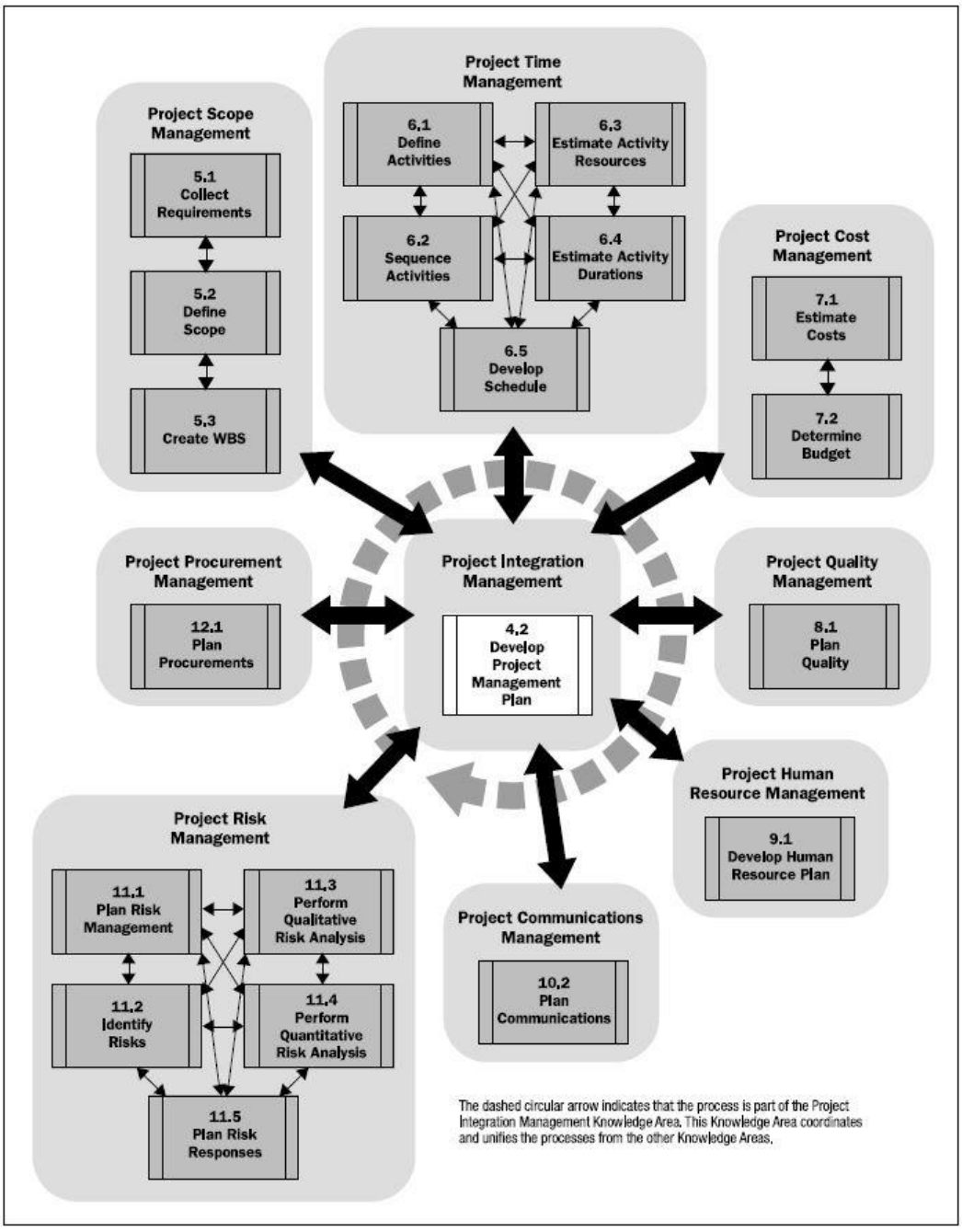

Figure 3. Planning Process Group /4, 47/

3.3.3 Executing Process Group

The Executing Process Group consists of processes which need to be completed in order to achieve the objectives set in the project management plan. This means coordinating people and resources, as well as executing the processes set in the

project management plan. The project execution phase is the most volatile of all project phases and as such needs close attention and careful planning in the project management plan. If need be, the inputs from execution processes may cause the need to alter the project management plan. Processes in this group include: Project team acquirement, development and management. Information and stakeholder management and conduction of procurements and quality assurance. /4, 55-59/

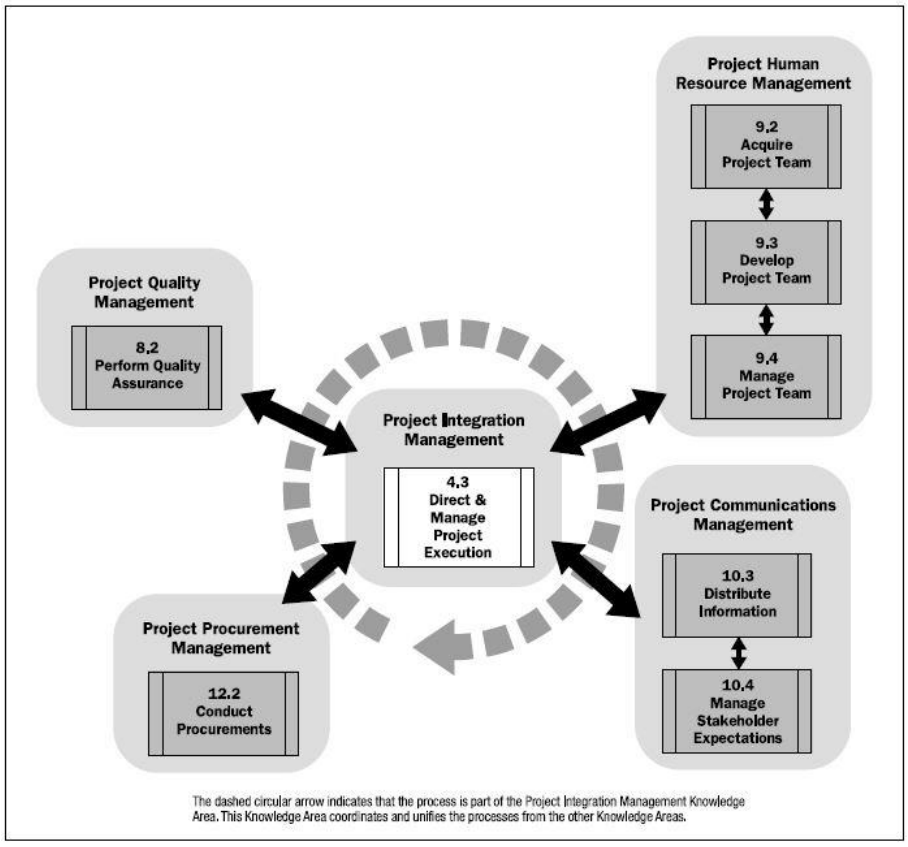

Figure 4. Executing Process Group /4, 56/

3.3.4 Monitoring and Controlling Process Group

The Monitoring and Controlling Process Group consists of those processes required to track, review and regulate the progress and performance of the project. This system works in the fashion of the Deming cycle: Plan, Check, Do, Act. The key benefit of this group is the consistent measurement and analysis of the project performance. Monitoring and controlling a project is the act of measuring project

process outputs and keeping these processes within given boundaries or alerting project management on needed changes based on changing project circumstances. Controllers keep track of project time-, cost-, quality-, communications-, risk-, procurement- and scope management and report to project management. /4, 59-64/

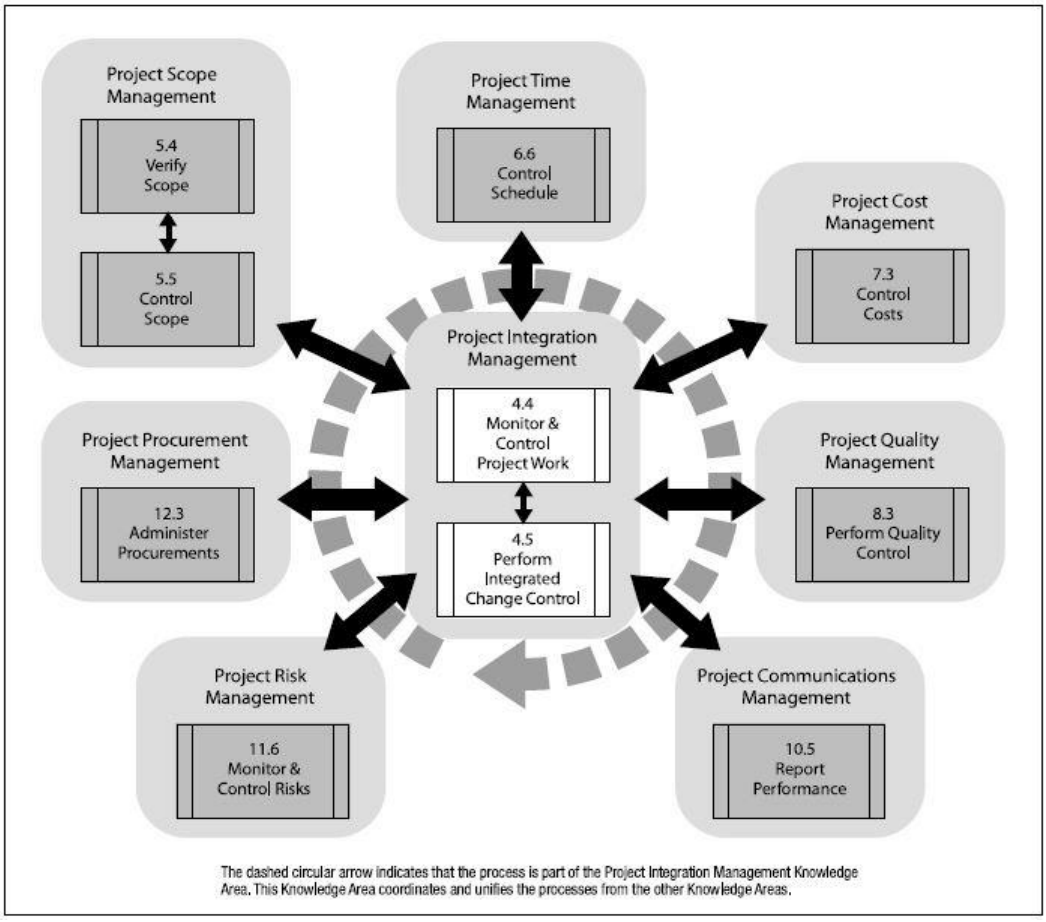

Figure 5. Monitoring and Controlling Process Group /4, 60/

3.3.5 Closing Process Group

The Closing Process Group consists of the processes needed to complete in order to finalize the project in a controlled manner and to ensure the proper documentation of handing over, post-project reviews and lessons learned to be archived. /4, 64-65/

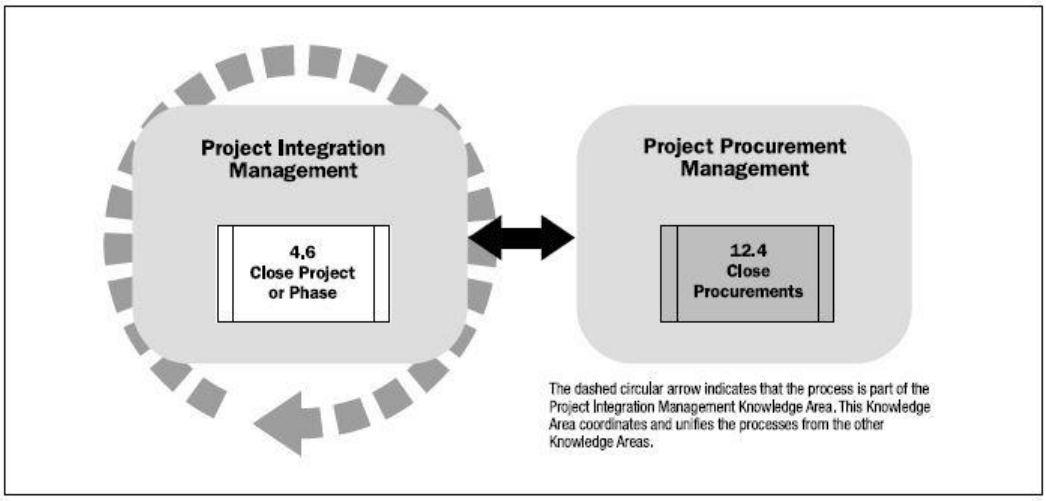

Figure 6. Closing Process Group /4, 65/

These five process groups should be a part of any well thought out project and act as a guideline to successful project execution. It must be remembered though, that each project is different and has different characteristics even though it may seem similar to a past project at first. It is up to the project management and project staff to find the best way to utilize these basic principles.

3.4 Roles in Projects

Roles in projects are not job descriptions, but activities which need to be completed in order to finish the project successfully. It is up to the project manager and key stakeholders to decide what kind of activities are critical to the successful completion of the project.

3.4.1 Project Manager

The project manager is the one responsible for the execution of the project. The project manager needs to consider all of the above mentioned aspects of the project and implement them accordingly. Due to the unique nature of projects it is important that the project manager not only follows best practices but also knows how to implement them. It is important for a project manager to have the following traits in order to complete the project successfully:

- Knowledge, which refers to what the project manager knows about the project and its special characteristics. A manager must know at least the fundamental responsibilities of the activities each project member is undertaking and thus is prepared to put things into context within the project.
- Performance, which refers to what the project manager is able to do or accomplish while applying their project management knowledge.
- Personal, which refers to the personal skills of the project manager. The project manager must be able to reconcile disputes with project members and make the project run smoothly while achieving project objectives and balancing the project constraints.

The project manager is assigned by the performing organization to achieve the project objectives. Project managers normally report to program- or portfolio managers and work closely with them to achieve the desired results.

The project manager should have a good understanding of project communications and stakeholder management, which are fundamental in decreasing the chances of problems in the project and difficulties in communication. If the project manager does not show a good skill set in said areas it is detrimental to the communication of the remaining organisation, and causes unnecessary burden to the team on-site performing the given task due to possible delays or misunderstandings because of the lack of communication.

3.4.2 Project Controller

Project controllers are situated close to the project managers for one their main tasks is to support the project manager and the project organization as an integrator and a facilitator in project planning, monitoring and control. This means that the project controller keeps track of daily project activities and ensures that the project stays within given constraints, such as schedule and budget. Project controllers also prepare project reports based on the project requirements, contract or other available information.

3.4.3 Project Engineers

Project engineers work in the home office and represent their own field of expertise such as mechanical, electrical or civil engineering and develop and manage technical solutions in accordance to contractual requirements. Project engineers work with the design team and customer in the early stages of the project to ensure a complete and timely delivery once the installation and commissioning phases take place. Project engineers are also responsible for sourcing of material and getting it to the site. Project engineers work closely with site engineers in issues regarding the on-site installation decisions and the finalization of design drawings.

3.4.4 Site Manager

The site manager is on site to ensure timely execution of all installation supervision and commissioning activities in accordance to baseline budget, agreed overall plan, milestones, applicable Quality Assurance system and HSE - Health, Safety and Environment - guidelines. Site manager is the main facilitator and ultimate decision maker on-site.

3.4.5 Site Engineer

The site engineer produces reports from the site to the home office and keeps track of agreed budget- and schedule constraints. The site engineer acts as the site manager’s right hand.

3.4.6 Site Supervisors and Commissioning Engineers

Site supervisors and commissioning engineers work on site supervising equipment installations and ensuring the quality and operation of machinery.

Site supervisors work with local subcontractors to achieve goals set in the project plan. Site supervisors report back to the home office to the project engineers about issues on site and to revise drawings and building plans for final revisions.

Commissioning engineers work on site with the machinery and equipment installed and prepare and execute the testing mandated by the site quality plan.

3.5 Communication in a Project

Project managers spend a good share of their time communicating either with the project team or other internal and external stakeholders. Thus, it is very important to know what to communicate to whom and when. The importance of identifying interested stakeholders is vital to successful communication and a well-executed project.

3.5.1 Identify Stakeholders – Stakeholder Management Plan

A stakeholder is someone who has interest on a project or is impacted by it and someone who should be taken into consideration when information about the project is being released. A stakeholder might be someone working with the project team or a third party consultant. Identifying the needs and possible effects of these stakeholders on the project is necessary to mitigate risks and in creating an effective project environment.

The stakeholder analysis is important in identifying who needs what information and who needs to be managed more closely than others. First, it is necessary to identify all the stakeholders and their relevant information, such as their role, departments, interests, knowledge levels, expectations and influence levels. Key stakeholders include high level decision makers, such as the project manager, the customer and the sponsor. The identification of stakeholders is achieved through interviews with already identified stakeholders.

The identified stakeholders have varying levels of influence on the project and should be categorized in a manner that helps efficient communication. In large stakeholder groups it is important to recognize key players, such as managers and decision makers, to focus communication on them. There are different ways to categorise stakeholders, for example by power and influence or by interest and impact. Identifying the most powerful stakeholders is the key to effective project execution. Assessment of how key stakeholders are likely to react or respond to

events in the project is important in order to enhance their support and mitigate potential negative impacts. Important stakeholder information should be readily available in an experienced project based business organization. Additional information should be sought after through interviews with other units in the organization, other project managers or external organizations.

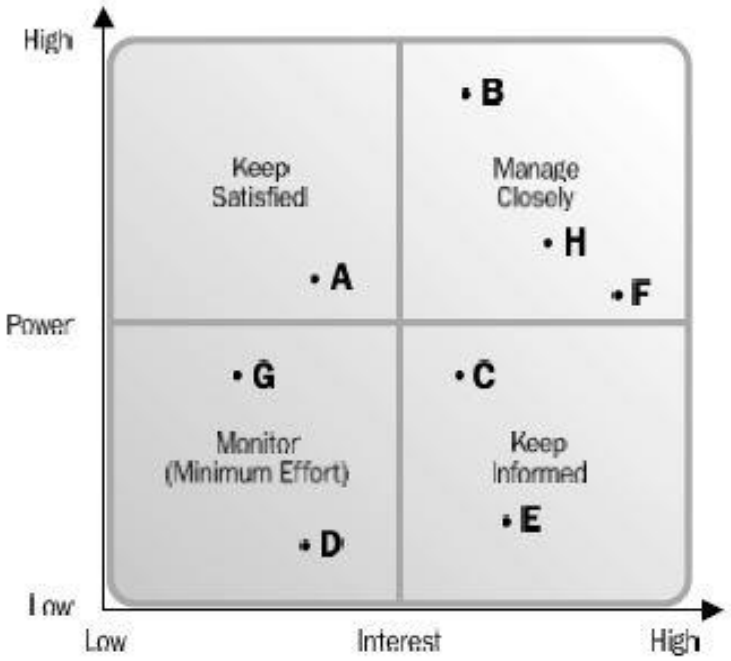

Figure 7. Example of stakeholder analysis /4, 249/

In the above figure the different actors in a project are ranked by how they are viewed regarding their influence and interest in the project. This analysis consists of a two by two grid, which has four areas for different types of communication. The grid labeled ”Monitor” has actors that require minimum effort in communication, for example the point ”D” with low interest and low power could be an outside actor like local residents near a site. Next level is ”Keep Informed” where actors have high interest, but low influence and could represent a group of designers who need to be aware of changes on site, but don’t necessarily have a lot of say in the changes themselve. Third level is the ”Keep Satisfied” category, where actors don’t have a lot of personal or professional interest in the project, but still can impose rulings which impact the site, like local government. Fourth and

most important category communication-wise is the high-interest, high-power – category in which are for example the end customer and project owner whos opinions need to be taken into account swiftly as they are highly influential. /4, 246-251/

3.5.2 Communications Planning

Communication planning uses the outputs of the stakeholder identification processes to create a structured way to share information in the project. Here it is defined who needs what information, when will they need it, how it will be given to them and by whom.

Insufficient communication planning can cause problems, such as delay in message delivery, communication of sensitive information to the wrong audience, or lack of communication to the required stakeholders. A good communication plan prepared early in the project allows sufficient allocation of resources to communication. The framework of the communication plan should be revised as necessary throughout the project to ensure continued applicability. Information typically used to determine project communication requirements includes organization charts, logistics of how many persons will be involved and at what locations, internal information needs, external information needs and stakeholder information from stakeholder register. /4, 251-253/

4 DOCUMENT CONTROL AND COMMUNICATION MANAGEMENT

Efficient communication management is important to pre-emptively stop small issues from becoming big problems. With the correct response to common problems in delivery projects it is possible to avoid pitfalls and unnecessary delays. Wärtsilä set out to bring in a new tool to manage documentation and project communication, the DCM365 cloud-based communication platform.

4.1 Systems Currently In Use

IDM, Integrated Document Management, is a part of the intranet system used by Wärtsilä to manage a large amount of information generated by different functions in the company. For a user in a project this means that a praticular project and all affiliated information in a structured directory where all past and present projects are listed. This creates problems for today's complicated project structures and information security. Wärtsilä is aiming for larger projects in the energy market and this creates the need to efficiently use third party experts in projects, currently approximately 80 persons per year, and they need to access Wärtsilä's information databases, which is now done by external identification tools to give a limited access to IDM pages, which might not even contain the wanted information. Another problem is this is not ideal as the IDM system is more like a vault for information generated, not a tool through which the employees could naturally communicate.

By easing document sharing, communication and tracking of communication, it is possible to analyze and then optimize communication protocols.

4.2 Corporate Relationship On-Line Feedback System

Wärtsilä uses a tool called Corporate Relationship On-Line (CROL), a service provided by PBI Research Institute, to gather customer feedback on the performance of the organization throughout the life cycle on the project. Through this

system customer feedback is systematically gathered, analyzed and utilized to improve products and services. It shows through different statistics, gathered by questionnaires, which areas of the projects are improving or declining and gives signals which can be then turned into processes to rectify these issues. Wärtsilä utilizes the performance improvement system in the manner of the Deming-cycle; Plan, Do, Check, Act, Communicate. The CROL system gives out major reports quarterly from which the organization can then see changes and act accordingly. Feedback is collected from customers in five different phases of the project, including sales phase, project phase, commissioning & handing-over phase, warranty phase and operation phase. This thesis focusing on the project- and commissioning phases. PBI's analysis of Wärtsilä's data has shown that there is a correlation between customer satisfaction and profits, which makes it feasible to follow up and correct reported issues.

Customer service, and customer service expectations, are no different from other fields of business in the power generation industry. Customers are learning to be all the more demanding and they are getting more knowledgeable. This is why it is important to pay attention to customers' needs and wants to stay ahead of the curve.

4.3 DCM365

DCM 365 is a document control module developed by Wärtsilä that runs on Microsoft Sharepoint cloud computing platform. It works as a portal for the user to access information they are looking for. The aim of DCM 365 is to provide accurate and up-to-date information of a project to the project team, engineers, third party Wärtsilä subcontractors, the customer and other stakeholders who have been granted access to the system.

DCM 365 is a website through which access to information is granted for a specific project. With the system it is possible for users to upload documents, search for stored documents, track project progress and communicate with stakeholders. All with the purpose of delivering better customer service.

Another main objective is to be able to use this system, and other applicable systems, through mobile devices and function as a pilot for future mobile development. It is a major time saver when the engineers can have all drawings and other relevant information with them on-site at all times and do not need to go the office to access these databases through their computers.

Handling most of the documents through the same systems increases information security and integrity. The platform provides uniform templates with which reports can be submitted, thus making the information more accessible and understandable. The use of a single channel provides security through trackability.

Cloud computing has its risks which should be taken into account when implementing such systems into big corporations' systems, such as Wärtsiläs.

Many times on sites the internet connections are not of good quality and in case the network is not operating properly the cloud is out of reach, thus rendering it useless. When creating mobile solutions to be used with DCM365, proper offline functions should be taken into consideration when designing the applications. Offline work capabilities with the possibility to upload created documents and information once the connection is back is important.

Although Microsoft is a proven business application provider and a major cloud service provider, it is to be remembered that it is a company that can change the operating principles of its services as it wishes. Also the data stored on the Microsoft cloud is at risk to be surveyed by an unauthorized party, such as government officials or hackers. The EU parliament, for example, has forbidden the use of the Microsoft Outlook mobile applications because of security risks.

Data privacy is of great concern. If documents end up to an unintended recipient, it could have counter-productive results. Internal minutes of meetings, for example, are documents that should not end up in the customers or consortium partners' hands. This risk can be minimized by, for example, setting limitations to what type of documents can be transmitted to who – documents need to marked as

a certain type in the very beginning, internal for example, and the type determines who it can or cannot be transmitted to.

4.3.1 DCM 365 Business Case

In the beginning of the DCM 365 project a case of benefits was presented that a cloud based communication tool could bring. One case was that the system should make day to day operation easier by offering a single place to send and manage documentation transmittals to customers and other stakeholders as per contractual agreements. This would also lower the number of e-mails sent with a lot of information and large attachments.

Document life cycle management would be easier with DCM 365 and the risk of using out dated drawings could be lowered. Automated and controlled data sharing and storage are the key in information security and integrity. Comments from customers and other external parties on on-going revisions would be tracked in one place – customer experience would be more positive with transparent and proactive communication.

Collaboration would be easier within the DCM 365 workspace system. Today external parties have a hard time connecting with project teams due to their limited access rights to the Wärtsilä business applications. This is problematic since third party experts are a growing group in delivery projects.

DCM 365 is a strategic project that is supposed to support operational functions and serve as a base for future developments.

4.4 DCM 365 Further Development

Further development of the DCM365 platform should aim to provide a better communication and information platform for on- and off-site usage and emphasize Wärtsilä’s proactivity and solution based approach.

Many times the on-site users of DCM365 are rather unexperienced supervisors and they usually are put straight to work with little guidance. This is a concept which should be taken into account when designing new features into the product.

4.4.1 Weekly Schedule for Inspections And Witness Points

Within the DCM365 tool there should be a calendar for each discipline from where all parties; site team, project team, subcontractors and the customer can easily find the dates for important tests and witness points. From the calendar, once the date and related tasks are found, the task can be clicked which then leads to a page where all the documents, such as drawings, procedures and instructions needed to perform the job can be found. This view can also show who is needed present as a witness and who performs the job.

This addition would decrease the amount of information the site team has to give out as hard- and soft copies to the subcontractors and would give the subcontractors time to educate themselves on the upcoming tasks. As for the customer it would be an easily accessible place to find out what is happening on site. It is also possible to make both an internal and an external version of this calendar, viewing will depend on the login rights. Wärtsilä employees would see the full schedule with more detailed tasks and upcoming events, whereas subcontractors would only see the inspections they are related to and so on.

4.4.2 Instructions And Information for Subcontractors

There should be a library of instructions and information which the subcontractors could access any time they feel the need. Quite often subcontractors come to Wärtsilä offices and ask for whatever they need, this could be avoided with a simple searchable library of instructions. The library should be easy to search for the subcontractors. It should have different disciplines from where to search and then narrowed down even further.

4.4.3 Instructions And Information for Wärtsilä Staff

All Wärtsilä and Wärtsilä supplier manuals and method statements should be in one collected place from which they can be easily found. Today hundreds of manuals are scattered all over IDM and on-site many times the best way to find a relevant manual is to ask if a colleague has it. If they do not, one cannot be sure if such a manual even exists.

4.4.4 Report Templates

A collection of report templates should be made available with relevant information and tips on how to effectively report.

4.4.5 Data Gathering

Reports should have an option to mark them as *interesting* to different parties. If for example during the pre-commissioning a fault is discovered in equipment, this could be identified in the report document by a simple checkbox. This fault-checkbox then sends the information to Power Plants' relevant department to investigate the deficiency further. Nowadays deficiencies go unreported many times, as the problems are just fixed on the spot and not reported further than maybe the site office.

4.4.6 Brief Overview of Project Contract

Project contracts are rather large legal agreements and they need to be referred to at the site, it will take up valuable working time from other tasks. There could be a brief overview of project contract and case examples to which site teams can quickly refer to when discussing, for example, the scope and responsibilities with the customer or subcontractors.

4.4.7 Organization chart

The organization chart is an easy-to-update chart of project- and site teams, customer and subcontractors. In large projects there can more than 10 people just on the Wärtsilä mechanical team and the same amount or more on the customer's and

partner's side and it is not easy keeping track on what areas are whose responsibility, e.g. cooling water systems, lube oil systems, fuel systems, etc. A chart with a picture, name, title, responsibilities and contact information would decrease confusion and allow information to always go directly to the responsible person. This could be upheld by the site engineer and should be easily updated.

4.4.8 Frequently Asked Questions

FAQ or "What to do first" is meant for the use of DCM365. Useful for solving common issues of Wärtsilä employees and a tool to introduce uninitiated Wärtsilä personnel and subcontractors to use the system.

4.4.9 NCR List

When a customer reports NCR's (non-conformity reports), or other issues, they should be written down on a separate list, which would make follow-up easier. The list should include: The issue, how to fix it, who is responsible, who brought it up and what is the deadline for the fix. This list should be a live document, maybe an Excel sheet, which anyone can update as they fix the NCR's.

4.4.10 Mini-CROL

A mini questionnaire where the customer can evaluate the performance of the site team and project team on a monthly basis. It gives an idea to the project manager how things are handled in the project and gives the opportunity to correct issues before they can affect the project performance.

4.4.11 Front Page Bulletin

The front page bulletin points on upcoming milestones and key achievements. It serves as a reminder and as a heads-up for people involved. It is also useful for visiting third parties who might not be as involved in non-official communication.

4.4.12 Service Letters

Service letters should appear on the front page. Project related service letters should be high-lighted.

4.4.13 Traffic Light Alert System on Home Page

A traffic light, green, yellow, red, indicator system on the home page indicates how approaching milestones are looking and what tasks are needed to complete before said milestone. It includes all Wärtsilä disciplines and partners' responsibilities. It is kept up-to-date by the site engineer or automatically by retrieving data from SQAD.

4.4.14 LogWis integration

The LogWiz system can be integrated into DCM365 with offline capabilities. Often there are dozens if not hundreds of shipping containers on site and materials are moved from one place to another on a regular basis. This causes problems when the on-site staff look for materials, which might be highly critical for the progress of the project. Offline mobile LogWiz would serve as a map when looking for materials either in laydown area or around the site.

4.4.15 SQAD integration

Offline SQAD integration to mobile devices is a desired feature in the future. It makes commissioning more realiable and faster by eliminating unnecessary manual input of information to the database. It also could include custom forms for each project – today all forms are alike for all projects. This would help also the work of junior supervisors by explaining only the needed steps and measurements instead of all possible variations of machinery.

5 SUMMARY

As Wärtsilä's projects are growing in size and number the need for efficient communication and information sharing is apparent. Not only is this necessary from a professional standpoint, but also for the internal reason to unify the ways of working between projects. The DCM 365 system should be developed in such a way that it complements not only the current ways of working but also new methodologies and innovation on the field and in the home office.

The DCM 365 system should also be developed in a way that helps new employees in site work. Machinery and systems are complex and diverse and for a new employee this can be overwhelming. Proper presentation and straightforwardness of manuals and instructions can help to prevent incorrect installations and unnecessary delays.

The DCM 365 system is a tool that should be used to make external communication more transparent. Often customers feel they are left outside of the communication loop when working out solutions for problems in a project. Customer involvement in the decision making process leads to more satisfied customers.

When the systems is released to all future sites, change management should be considered carefully. For the DCM 365 to be efficient it needs to be widely adopted, and users need thorough information in how to use the system effectively. The wide and wise usage of the system is the key to its success.

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